IDAHO
DEPARTMENT OF FISH & GAME

Jerry M. Conley, Director

McCall Hatchery

Annual Report

October 1, 1980 - September 30, 1981

by

Patrick F. Chapman
Fish Hatchery Superintendent I

June 1982

TABLE OF CONTENTS

LIST OF TABLES

LIST OF TABLES (Continued)

LIST OF FIGURES

APPENDIX

McCall Hatchery

ABSTRACT

Five species of trout were reared at McCall Hatchery during 1981 and we produced 1,173,490 trout fry and fingerlings (4,293.6 lb) from 1,436,720 eggs received (60.3% survival). Trout fry and fingerlings were fed 6,632 pounds of fish feed resulting in a feed conversion of 1.54 pounds feed required to produce one pound of fish.

McCall Hatchery personnel and other Fish and Game personnel planted 168,215 trout fry in 185 mountain lakes in central Idaho and planted 93,811 catchable-size rainbow trout in 17 lakes and reservoirs and 25 rivers and streams in the McCall area. Fish transfers to other stations totaled 352,301 fish (1,194.45 pounds).

A number of disease outbreaks occurred in trout reared at McCall Hatchery. Mortalities resulting from these diseases generally were low but effectiveness of treatments given ranged from poor to excellent.

No westslope cutthroat trout eggs were taken at Fish Lake this year.

McCall Hatchery personnel conducted a study utilizing jaw-tagged catchable rainbow trout planted in the North Fork Payette River. Fish reported caught prior to October 1, 1981 spent an average of 24 days in the river prior to being caught by anglers; most (72.8%) did not migrate from location planted and of those exhibiting migration, most (67.3%) moved distances of less than one mile. Of the 54 fish that migrated distances greater than one mile, 33 moved downstream an average of 4.1 miles and 21 moved upstream an average of 4.2 miles.

Author:

Patrick F. Chapman
Fish Hatchery Superintendent I

OBJECTIVES

The objectives of McCall Hatchery are to:

1. Redistribute approximately 35,000 pounds of catchable-size rainbow trout reared at Hagerman Hatchery into 33 streams and 20 lakes and reservoirs **in** Regions 2 and 3.

2. Hatch and rear approximately 1,500,000 trout fry for stocking in lowland waters and mountain lakes and for redistribution to other stations.

3. Stock approximately 600 mountain lakes in Regions 2 and 3 on a three-year rotation basis.

4. Operate and maintain a fish trap at Fish Lake for the purpose of obtaining ,westslope cutthroat eggs.

INTRODUCTION

McCall Hatchery was constructed in 1979 by the U.S. Army Corps of Engineers in partial fulfillment of requirements of the Lower Snake River Fish and Wildlife Compensation Plan, which was authorized to compensate for losses caused by the lower Snake River dams (Ice Harbor, Lower Monumental, Little Goose and Lower Granite). Although designed primarily to produce summer chinook salmon, the McCall Hatchery is also used to redistribute catchable rainbow trout and to hatch and rear various trout species for planting in waters throughout the area. Funding for trout programs is provided by Idaho Department of Fish and Game and for the period April through September the Fish Hatchery Superintendent I stationed at McCall supervises these programs. This report covers all programs funded by the Idaho Department of Fish and Game.

Located approximately 1/4 mile southeast of the Payette Lake regulating dam, McCall Hatchery lies within the city limits of McCall in Valley County, Idaho (Figure 1).

Twenty cubic feet per second of water is needed for normal hatchery operations which is supplied from two intakes from Payette Lake, one drawing surface water at the dam, the other drawing water from a depth of 50 feet. Water temperatures of these sources range from 32° to 75° F necessitating mixing water from both sources to obtain desirable temperatures. Resulting water temperatures in the hatchery range from 38° F in winter to 55° F in summer.

Fish rearing and holding facilities at McCall Hatchery include 26 eight-tray stacks of Heath incubators, 14 indoor concrete deep vats (4 feet X 40 feet), two outdoor gravel-bottom ponds (42 feet X 200 feet) and one outdoor collection basin (15 feet X 101 feet). Trout eggs are hatched in the incubators, the fry are reared in the vats and catchab[l]e rainbow trout are held in the collection basin prior to redistribution. No trout are reared in the gravel-bottom ponds as these are used exclusively for salmon production.

FISH PRODUCTION

Hatchery personnel reared five species of fish at McCall Hatchery this year with percent survivals (fish planted and transferred : eggs received) ranging from 28.8% to 90% (Table 1). We produced 1,173,490 trout fry and fingerlings (4,293.6 pounds) from 1,436,720 eggs received (60.3% survival). No trout were on hand at the beginning of the 1981 fish year and we planted or transferred the year's production prior to the close of the fish year.

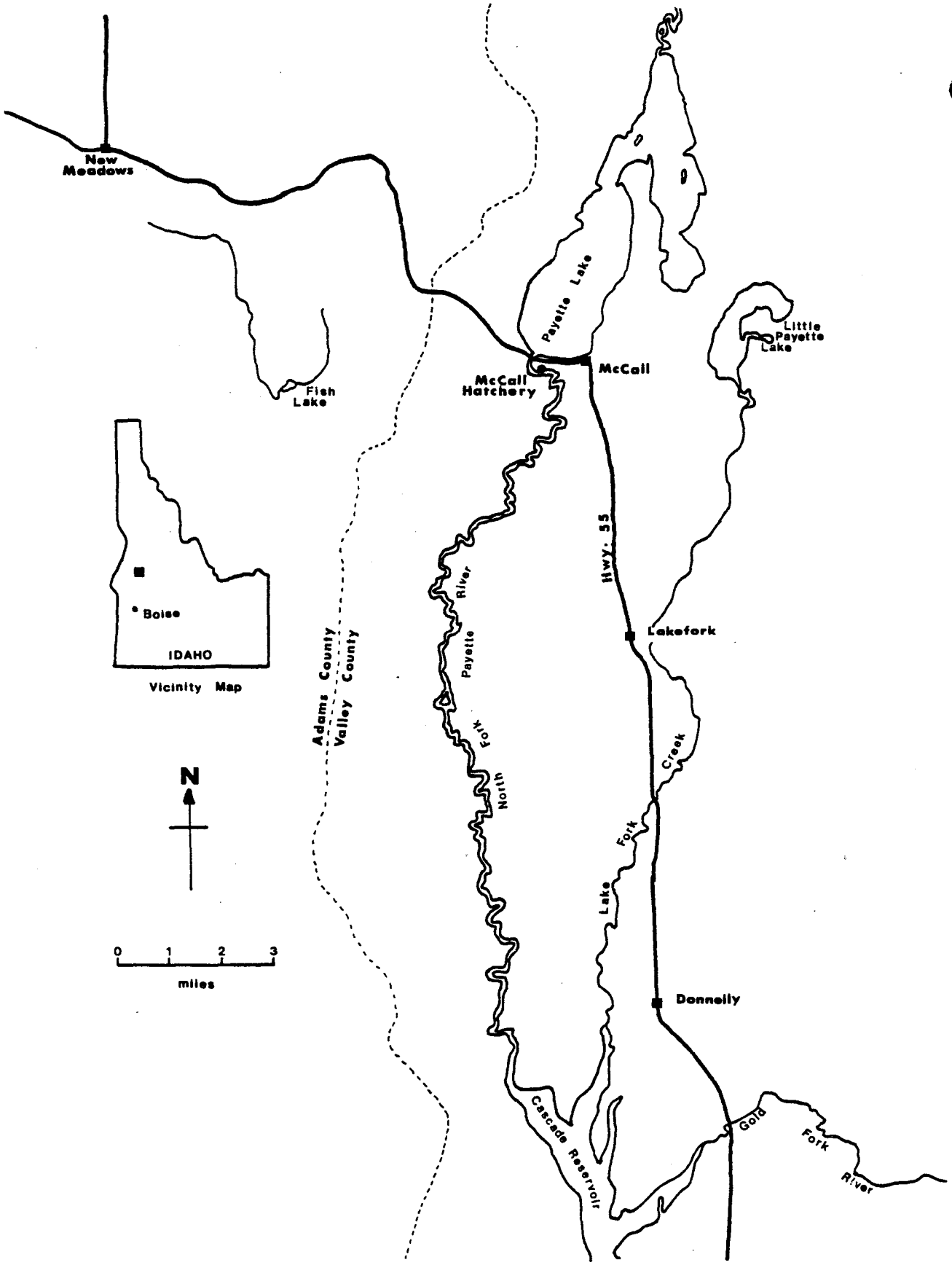

Figure 1. Location of McCall Hatchery.

Since we obtained no eggs from the cutthroat trout in Fish Lake this year, all of the eggs received were from outside sources including three U.S. Fish and Wildlife Service hatcheries, one Idaho Department of Fish and Game hatchery and one commercial hatchery (Table 2).

Table 1. Trout production at McCall Hatchery.

Species	Eggs received	Fish ponded	Percent hatch	Fish produced	Percent survival	Pounds produced
Rainbow	296,516	238,077	80.3	241,0113/	81.3	1,169.7
Fine-spot Cutthroat	232,596	167,825	72.2	67,050	28.8	450.0
CT X RC Hybrids	285,310	176,707	61.9	105,010	36.8	197.7
Brown	534,548	498,613	93.3	374,582	70.1	1,970.4
Lake	87,750	92,268	N.A.I/	78,077	90.0	505.8
Totals	1,436,720	1,173,490	80.22/	865,730	60.3	4,293.6

1/ Percent hatch not meaningful due to error in enumerating eggs or fry. 2/

2/ Excludes figures for lake trout.

3/ Number produced greater than number ponded due to sampling error.

Table 2. Sources of trout eggs received at McCall Hatchery.

Species	Date received	Source
Rainbow	5/1/81	Trout Lodge, Washington
Fine-spot Cutthroat	1/16/81	Auburn State Fish Hatchery, Wyoming
CT X RC Hybrids	5/8/81	Henry's Lake State Fish Hatchery, Idaho
Brown	11/20/80	Crawford National Fish Hatchery, Nebraska
Lake	11/6/80	Jackson National Fish Hatchery, Wyoming

FISH HEALTH

We experienced a wide range of disease problems in our trout this year (Table 3). Each species of fish was affected by at least one disease with varying degrees of mortality.

Dissolved nitrogen levels in the water of up to 104% from March through May resulted in gas bubble disease in the brown, lake and cutthroat trout. The disease manifested itself differently in each species. Least affected were the lake trout, with only four fish found with gas bubbles. Two of these had gas bubbles in the body cavity near the remaining yolk sac while the other two had overfull gas bladders,

presumably due to nitrogen supersaturation in the water. All of these fish were unable to maintain equilibrium. Mortality was negligible in the lake trout due to this disease and perhaps was because of the vertical distribution of these fish in the vat. At this time the lake trout utilized only the bottom few inches of the vat. This depth (approximately 24 inches) may have reduced the effects of the high nitrogen levels. The other species exhibiting gas bubble disease utilized the full depth of the vat to a greater extent and also had a higher incidence of the disease.

Also affected by gas bubble disease were the Snake River fine-spotted cutthroat trout. Our cutthroat had gas bubbles in the body cavity, but also in the gastro-intestinal tract, mainly the intestine. Many of these fish were still able to maintain equilibrium. Food present in the gut indicated they were still able to feed or were only recently incapacitated by it. Mortality caused by this disease was low.

Table 3. Disease history of trout at McCall Hatchery.

Date	Species	Disease	Treatment	Effectiveness	Condition at Release
March, April, May	Brown	Gas bubble	none	-	good
March, May	Lake	Gas bubble	none	-	excellent
April, May	Cutthroat	Gas bubble	none	-	excellent
June	Cutthroat	Aeromonas sp.	TM-50	none	excellent
June	Brown	Aeromonas & Pseudomonas	TM-50	good	good
June, July	Brown	Hexamita sp.	Epsom salt	limited	good
July, August	CT X RC Hybrid	Myxobacterial gill	Cutrine, Benz. Chi.	none	fair
			Chloramine-T	limited	fair
August	CT X RC Hybrid	Hexamita sp.	Epsom salt	limited	fair
August	CT X RC Hybrid	Costia sp.		none	fair
August	CT X RC Hybrid	Costia sp	Formalin	excellent	excellent

Our brown trout had the highest incidence of gas bubble disease although mortality was low in these fish also. Gas bubbles were seen mostly in the intestine, but were also found in tissues of the branchiostegals, opercles, dentary and below the eyes. Most of the affected fish had difficulty maintaining equilibrium, but many also were apparently still feeding since food was present in the stomach and intestine.

Despite removing the siphon tubes from the vat inlet pipes and experimenting with one splashboard, we could not reduce the level of dissolved nitrogen in the water. Gas bubble disease remained a problem in these fish until the end of May when nitrogen levels declined.

Systematic bacterial diseases showed up in some of our fish in June. Hatchery personnel diagnosed Motile Aeromonas Septicemia in the cutthroat trout at this time. These fish may have been infected much earlier than this, however, since mortality was high ever since ponding. Fish in one vat were treated for ten days with TM-50 top-dressed on feed at a concentration of three grams Terramycin per 100 pounds of fish and fish in the other vat were not treated. Mortality in the treated lot showed no difference from the untreated lot and mortality in both remained high until early July. Based on these results, this method of treatment for this disease does not appear effective and other treatments should be attempted in the future. We lost approximately 24% of our cutthroat to this disease.

Our brown trout also were afflicted with Aeromonas sp. bacteria in June as well as with Pseudomonas sp. bacteria. Identification was made by Joe Lientz (Area Fish Disease Biologist, USFWS) from cultures isolated from these fish. At the same time, hatchery personnel found the browns to be infected with the protozoan parasite (Hexamita sp. in the gut (which was later confirmed by Harold Ramsey, Fish Pathologist, IFG). The bacterial infection was treated for 14 days with TM-50 top-dressed on feed at a dosage of four grams Terramycin per 100 pounds of fish. Few bacteria were found following treatment. The Hexamita sp. infection proved impossible to permanently cure, however. Two treatments using epsom salts top-dressed on feed at three percent of feed weight for three days failed to eliminate the parasite for more than a few days and the infection persisted through July. Mortality from these diseases was moderate but remained elevated for over two months.

Additional bacterial cultures from brown trout were sent to Joe Lientz in August and these were again identified as Aeromonas sp. and Pseudomonas sp.; however, he also found small numbers of Yersinia ruckeri, the causative agent of Enteric Redmouth disease. We do not feel this organism was a major factor in the elevated mortality seen in the brown trout, but apparently this is the first time it has been identified at McCall Hatchery.

We achieved only slightly better success at rearing CT X RC hybrids this year (36.8% survival) compared with last year (31.5% survival) but for somewhat different reasons (Hutchinson, 1980). The eggs were received in excellent condition but mortality was high (38.1%) for unknown reasons while **in** the incubators. Almost immediately upon ponding these fish, hatchery personnel diagnosed bacterial gill disease which was later confirmed by Joe Lientz as myxobacterial gill disease. We treated three different times with a one-hour drip of Cutrine-Plus followed immediately with a one-hour drip of benzylkonium chloride. Eadh treatment lasted three days. Each one-hour drip of Cutrine-Plus was at a concentration of one ounce/cfs inflow and the concentration of benzylkonium chloride began at six ounces/cfs the first day and was increased to seven ounces/cfs the second day and eight ounces/cfs the third day. No improvement in the high rate of mortality was seen and since many bacteria were wtill present on the gills the treatment was deemed ineffective.

A treatment using Chloramine-T for a one-hour drip at a concentration of six and one-half ppm of inflow was then performed (From, 1980). Post-treatment examination of gills revealed possibly some reduction in numbers of bacteria present; however, mortality remained elevated. Further treatments with Chloramine-T would have been attempted, however, since our supply was exhausted and a new supply not readily available and the fish were being planted, no further treatments were performed.

During this time two protozoan parasites were diagnosed in the hybrids by hatchery personnel. Hexamita sp. was found in the gut and Costia sp. was found on the skin. One treatment for Hexamita sp. was performed in the same manner as that of the brown trout with equally unsuccessful results. Costia sp. was not treated in the hybrids because of the fact that they were simultaneously afflicted with myxobacterial gill disease and the treatment of choice (formalin) is reputed to cause high mortality in these cases (Wood, 1979 and Warren, 1980).

Our rainbow trout also were diagnosed by hatchery personnel to be suffering from a Costia sp. infection and were treated successfully with a one-hour drip of formalin at a concentration of 150 ppm. No fish were killed by the treatment and very few Costia sp. were found following the treatment.

FISH TRANSFERS AND PLANTING

Transfers

Hatchery personnel planted the majority of the fish reared at McCall Hatchery in waters of this area and so we made only two transfers of fish to other stations (Table 4). We transferred a total of 352,301 trout to Hagerman Hatchery weighing 1,194.45 pounds.

Table 4. Transfers of trout from McCall Hatchery.

Date	Species	Receiving station	Numbers transferred	Number per pound	Pounds transferred
5/21	Brown	Hagerman	183,450	948.3	193.45
9/21	Rainbow	Hagerman	168,851	168.7	1,001.00
TOTALS			352,301		1,194.45

Catchable Planting

Due to low water temperatures, McCall Hatchery is incapable of economically producing catchable-sized rainbow trout. Consequently, catchables must be transferred to McCall from Hagerman Hatchery for redistribution by McCall Hatchery personnel during the period between mid-May to the end of August. Our planting area includes portions of Regions 2 and 3 and encompasses waters in Adams, Idaho, Valley and northern Washington counties (Figure 2).

Due to budget constraints, the Idaho Fish and Game Commission requested that catchable planting be reduced 15% statewide during 1981. Hatchery personnel as well as other department personnel consequently made recommendations to eliminate stocking of various waters in the area as well as to reduce the level of stocking in others to comply with this request. Most of these recommendations were approved, resulting in 17 lakes and reservoirs (one less than 1980) and 25 rivers and streams (eight fewer than 1980) being planted by hatchery personnel.

We planted 93,811 catchable rainbow trout in 1981 weighing a total of 23,732 pounds and averaging 3.95 fish per pound. This represents 80.1% of the number of fish planted last year (117,128) but only 67.8% of the poundage planted last year (35,000) (Hutchinson, 1980).

Fry and Fingerling Planting

During 1981, hatchery personnel planted 269,038 trout fry and fingerlings (2521.1 pounds) in lowland waters of the area. In addition, Eagle Hatchery personnel planted 76,195 brown trout fry (246.5 pounds) in the Boise area for McCall. A total of 345,233 trout fry and fingerlings (2767.6 pounds) were planted from McCall in four rivers and streams and five lakes and reservoirs.

Mountain Lake Planting

McCall Hatchery is responsible for planting approximately 600 mountain lakes with trout fry in Regions 2 and 3 on a three-year rotation basis; roughly one-third being planted each year. Our planting area encompasses lakes in the Snake, Boise, Salmon and Clearwater river drainages (Figure 2) and occasionally other drainages as well

Most lakes are planted with fixed-wing aircraft (Cessna 185) under contract with McCall Air Taxi. A fish-release hopper is mounted in this plane to facilitate release of the fry. Hatchery personnel also plant a few lakes each year by backpack.

Between August 7 and August 21, we planted 96,829 CT X RC hybrid trout (172.72 pounds) averaging 560.61 fish per pound and 69,416 rainbow trout (155.38 pounds) averaging 446.75 per pound in 183 mountain lakes by fixed-wing aircraft in Regions 2 and 3. Twelve flights were required to accomplish these plants (although one flight was aborted after takeoff due to poor weather) for a cost of $4,075.86. This represents a plane rental cost per lake planted of $22.27.

In addition to those lakes planted by air, hatchery personnel planted one lake by backpack with 758 rainbow trout (4.0 pounds) and Senior Conservation Officer Fred Edwards and Regional Supervisor James Keating also planted one lake by backpack with 1,212 hybrid trout (4.0 pounds).

Mountain lake planting began later than normal this year. Consequently, our fry were too large to allow us to fulfill the allocations for many lakes since only one pound of fish is put in each planting bag and the plane holds a maximum of 36 bags. In addition, the poor success we experienced in rearing the hybrids limited the number of these fish available for planting. In the future, we hope to begin planting in early July to eliminate these problems.

In some cases, many of the fish loaded in the bags did not survive to planting. The worst cases of high mortality prior to planting were in the hybrid trout which was not surprising considering their poor condition at the time. However, occasionally the rainbow trout would also experience high preplanting mortality for unexplained reasons. In apparently good health, no more than one pound of fish was loaded into three-gallon milk bags containing one gallon of chilled water. Oxygen was then added to each bag. These loading densities are less than those recommended by Gebhards (1965) although he recommends adding more oxygen than we are able to. Temperature shock did not appear to be the cause of these mortalities as the fish exhibited no signs of stress upon bagging. Hatchery water temperature was 50° F and the chilled water they were loaded into was 42° F. If these mortalities continue nex year, more investigation into the cause will be necessary.

SPAWNTAKING OPERATIONS

McCall Hatchery personnel again attempted to trap the spawning run of westslope cutthroat trout from Fish Lake this year in an attempt to take eggs. As was the case in 1980, we failed in our attempts.

Fish Lake is located approximately six miles east of McCall (Figure 1) and is owned by Idaho Department of Fish and Game. Fishing is no longer allowed in the lake since it is being maintained as a brook lake for westslope cutthroat trout.

In October 1978, 3,360 two-year-old westslope cutthroat trout were planted in Fish Lake and the same number was again planted in October 1980 from Rochat Pond in northern Idaho. Surviving fish from the 1978 plant were five-year olds in 1981, the normal age of spawning for westslope cutthroat trout (Simpson and Wallace, 1978).

On March 23, hatchery personnel installed a picket weir V-trap and an additional picket weir to serve as a holding area in Fish Creek approximately 0.4 mile upstream

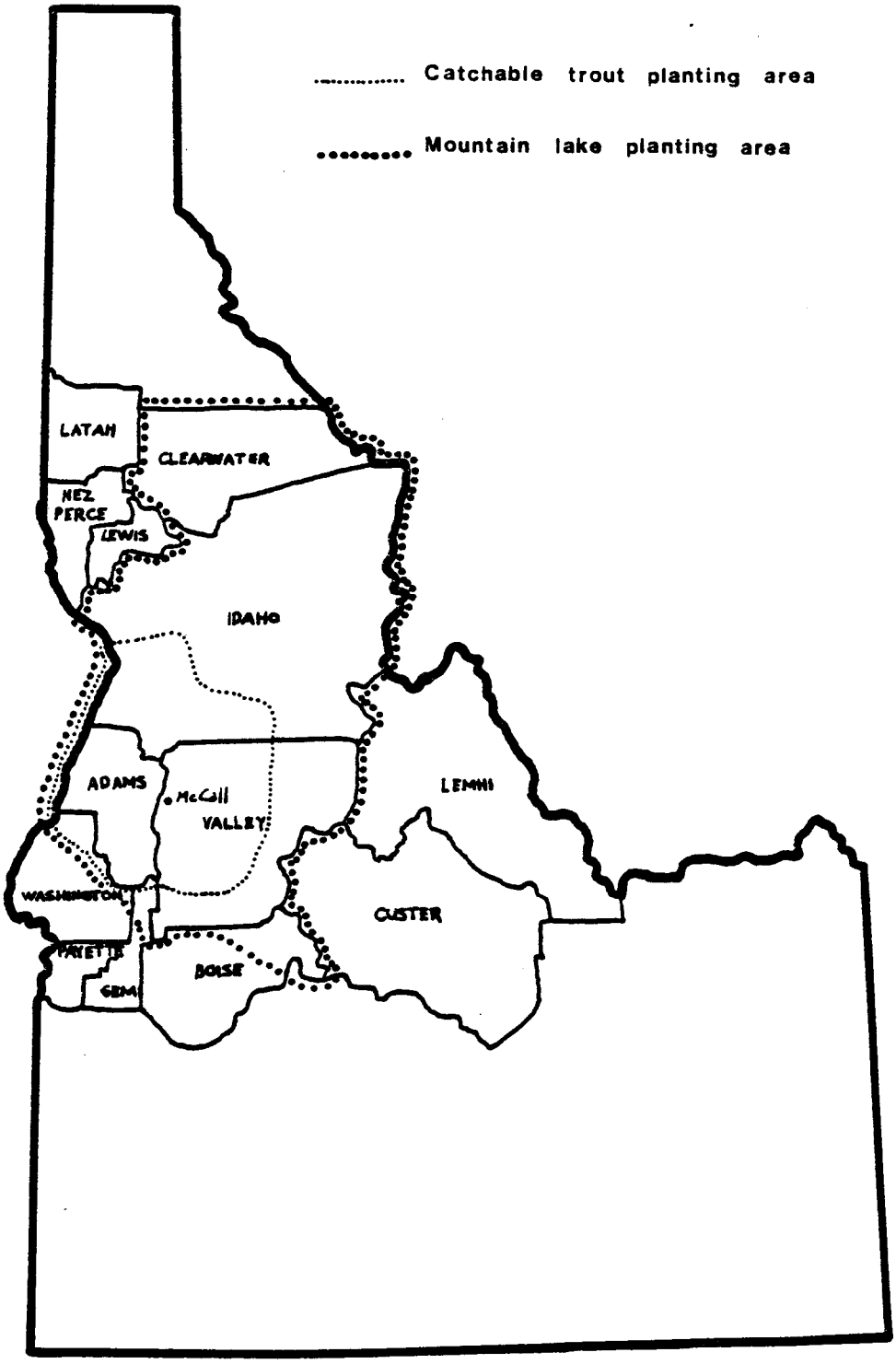

Figure 2. Catchable trout and mountain lake planting area covered by McCall Hatchery.

from its confluence with Fish Lake. On March 27, the first fish, a ripe male cutthroat, was observed in the trap. No additional fish were trapped until April 16 when 125 cutthroat and four hybrid trout were trapped. Fish continued to be trapped and placed in the holding area until April 19, at which time a total of 188 cutthroat trout had been trapped. However, of these, only eight were females. On April 19, Fish Creek rose substantially because of rapid snowmelt and rainfall and washed around the weir and trap resulting in the escape of all the fish. Water levels did not recede enough to trap fish until April 23 and only one fish was trapped after this date.

On April 28, hatchery personnel, Regional Fishery Biologist Donald Anderson and Fishery Research Biologist Ned Horner electrofished portions of Fish Creek above the trap site. Fifteen male and no female cutthroat trout were captured, indicating the run had been primarily composed of male fish at least up to that point.

Since no fish were being trapped and it appeared the spawning run was complete, the trap and holding area weirs were removed on May 11.

Funds have been encumbered to construct a permanent trap and holding facility prior to the 1982 spawning run and the Bureau of Engineering has drawn plans for this facility. Construction is scheduled to begin in October, 1981 and if it proceeds according to schedule, we should be able to successfully trap and spawn future runs of westslope cutthroat trout.

FISH FEED UTILIZED

Oregon Moist Pellet, Formula II and Rangen Dry Trout feeds were fed to the trout at McCall Hatchery in various sizes during 1981 (Table 5). We fed our trout fry and fingerlings a total of 6,632 pounds of feed at a cost of $2,446.41 resulting in a feed conversion of 1.54 pounds of feed required to produce one pound of fish.

An additional 700 pounds of OMP II 3/32 inch pellets was fed to the catchable rainbow trout to maintain them prior to redistribution at a cost of $260.60. No feed conversion was recorded.

When the feed fed to the catchables is added to that fed to the fry and fingerlings, feed conversion drops to 1.71 pounds of feed required to produce one pound of fish. At McCall, the cost, excluding capital outlay items, of producing each pound of fish was $6.83.

Table 5. Fish feed fed to fry and fingerling trout at McCall Hatchery.

Brand	-Feed size	Pounds fed	Cost
OMP II	Starter	216	$ 74.94
OMP II	1/32	2,366	859.94
OMP II	3/64	2,700	1,061.10
OMP II	1/16	150	55.50
OMP II	3/32	650 1/	236.80
Rangens	Fry #3	550	158.13
TOTALS		6,632	$2,446.41

1/ An additional 700 pounds 3/32 pellets fed to catchables.

McCall Hatchery personnel conducted a study utilizing jaw tagged catchable rainbow trout planted in the North Fork Payette River between Cascade Reservoir and Payette Lake this year. At the time of this writing, the study is ongoing and so this will be only a preliminary report of the results. A report for the completed study will be submitted at a later date.

Objectives

1. Determine if movement of catchable rainbow trout occurs when planted at various locations in the North Fork Payette River.

2. Determine if any rainbow trout planted in the North Fork Payette River contribute to the Cascade Reservoir fishery.

3. Determine average number of days fish remain in the North Fork Payette River before being caught.

4. Determine if angling pressure warrants planting 8,000 to 10,000 catchable rainbow trout in the North Fork Payette River between Cascade Reservoir and Payette Lake.

In 1980, 10,000 catchable rainbow trout were planted in the North Fork Payette River between Cascade Reservoir and Payette Lake. Hatchery personnel at McCall questioned whether angling pressure was sufficiently high to warrant this number of fish planted. Also during that year, creel census on Cascade Reservoir revealed numerous hatchery-reared rainbow trout in the catch that were of unknown origin. All catchable rainbow trout planted in the reservoir that year were fin clipped to indicate location planted and some fish caught were unclipped, suggesting perhaps these fish moved into the reservoir from one of the tributaries planted by McCall Hatchery. Ned Horner, Fishery Research Biologist on Cascade Reservoir felt that many of these fish may have migrated out of the North Fork Payette River (Ned Horner, personal communication). To resolve these questions, we proposed planted jaw-tagged trout in the river and analyzing data returned by anglers after catching tagged fish.

Materials and Methods

The study area encompasses over 24 river miles of the North Fork Payette River between Cascade Reservoir and Payette Lake as well as Cascade Reservoir (Figure 3). Between May 23, 1981 and August 26, 1981 8,000 catchable rainbow trout averaging 3.8 fish per pound were tagged by hatchery personnel with individually number, size eight monel jaw tags. Tagging was performed on the day of each plant and was accomplished using needle nose pliers as well as tagging pliers. Fish were anesthetized with tricain methane sulfonate (MS-222) prior to tagging and allowed to recover in a tank of fresh water after tagging. We transported the fish to planting location in an oxygenated fish tank filled with water from the hatchery collection basin.

Tagged fish were planted at six locations on eight different days (Figure 3, Table 6) with location planted, date and tag numbers recorded for each plant. After June 30, no fish were planted below Sheep Bridge because of high water temperatures (>70° F).

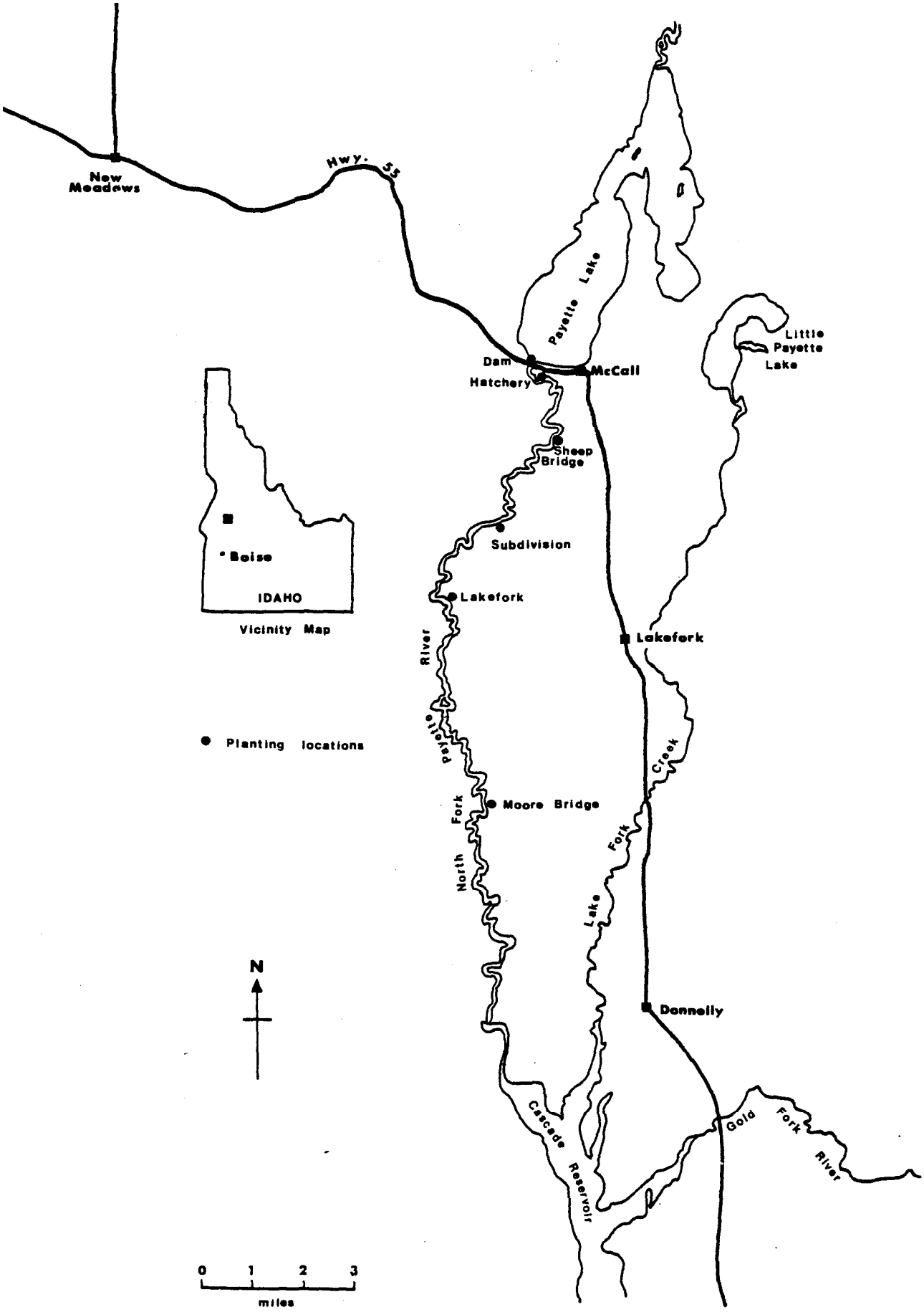

Figure 3. North Fork Payette River tagging study area and planting locations.

Table 6. Tag numbers, date and location planted of tagged fish planted in the North Fork Payette River.

Tag numbers	Date planted	Location planted
K 1- 500	5/22	Between dam and hatchery
501-1000	5/22	Sheep bridge and Moore bridge
1001-1400	6/11	Between dam and hatchery
1401-1800	6/11	Sheep bridge
1801-2000	6/12	Subdivision
2001-2200	6/12	Lakefork
2201-2400	6/12	Moore bridge
2401-2700 1/	6/30	Dam
2701-3000	6/30	Hatchery
3001-3300	6/30	Sheep bridge
3301-3500	6/30	Subdivision
3501-3700	6/30	Lakefork
3701-3900	6/30	Moore bridge
3901-4300	7/16	Dam
4301-4600	7/16	Hatchery
4601-4900	7/16	Sheep bridge
4901-5300	7/29	Dam
5301-5600	7/29	Hatchery
5601-6000	7/29	Sheep bridge
6001-6700	8/26	Dam
6701-7300	8/26	Hatchery
7301-8000	8/26	Sheep bridge

1/ Twenty-three fish with tags in 2400 series planted at hatchery on 6/19.

Tag return boxes were placed at major access points along the river with paper and pencils for anglers to submit information with. Local sporting goods retailers were persuaded to accept information from anglers and informational signs were posted in these establishments and along the river explaining to the angler what information was needed. News releases appeared in the local newspaper, on the local radio station and in Boise area newspapers informing the public of the study and requesting assistance in supplying information. Tag return boxes and retailers were checked periodically for tag returns and the boxes were replenished with paper as needed. Ned Horner and his biological aides checked for tagged fish in their creel census work on Cascade Reservoir.

Information from tag returns was recorded when it was received and analyzed at a later date. Information on movement and time spent in the river for each fish caught was returned to anglers that supplied us with an address and requested this information.

Fish movement was calculated using location each fish was caught, as reported by the angler, and location planted. River mileage was determined with a map wheel on standard 1:24,000 and 1:62,500 U.S. Geological Survey topographic maps. Number of days each fish was in the river before being caught was determined by counting back from date reported caught to date planted.

FINDINGS

The first three plants of tagged fish in this study were at multiple locations without recording specific tag numbers of fish planted at each specific location (Table 7). As a consequence, movement data for those fish planted on May 22 at Sheep and Moore bridges is not very meaningful, since it is not clear where fish caught from this plant were planted. A fish caught at Sheep bridge from this plant, for instance, may have been planted at Sheep bridge, and therefore not moved from planting location, or may have been planted at Moore bridge and therefore moved 13 miles upstream. This problem of uncertain movement occurs with the May 22 and June 11 plants between the dam and hatchery to a lesser degree since the distance between the two locations is only one-half mile.

In analyzing movement data from these three plants, fish caught at a location that was planted were deemed not to have moved from location planted and those that definitely showed movement from location planted (caught upstream or downstream from Sheep and Moore bridges and downstream from the hatchery) were deemed to have moved the lesser of the two possible distances (i.e. fish K600 caught two miles below Sheep bridge was deemed to have moved two miles downstream, rather than 11 miles upstream from Moore bridge). These assumptions most likely are not strictly valid, but are supported by the fact that the majority of tagged fish caught during the study exhibited no movement from location planted and of those that did migrate from planting location, greater than 66% moved less than one mile (Table 8).

Table 8. Number and percent of tag returns with movement data by distance moved.

	Distance moved		
	None	< 1 mile	1 mile
Number	443	111	54
Percent	72.8	18.3	8.9

Anglers reported catching 773 tagged fish during the period May 22 to September 30, 1981. However, 22 tag numbers were reported twice, probably due to errors in reporting the tag number. In analyzing the data, duplicate returns were counted as one return but data for movement and time in the river was not used. Net number of tag returns therefore was 751 which represents 9.4% return of tagged fish planted. Percent returns for each planting location and date varied considerably and ranged from 1% to 18% (Table 7). Percent returns from fish planted at the three planting locations above Sheep bridge were considerably greater than for the three locations below Sheep bridge (>9.5% and <2.75%, respectively) (Table 9).

More tag returns indicated location the tagged fish was cuaght than indicated date caught, with 608 returns having usable information on location caught. At least one fish from each plant migrated one-eighth mile or more and a total of 165 (26.4% of returns) showed movement of greater than one-eighth mile (Table 7).

The majority (67.3%) of fish migrating from location planted moved less than one mile. Fifty-four (32.7%) of the fish showing movement were caught more than one mile from location planted. Of these, 33 moved downstream an average of 4.1 miles and 21 migrated upstream an average of 4.2 miles. More fish migrated distances greater than one mile from early plant than did those from later plants (Table 10). Most fish (443, 72.8% of returns) caught during the study, however, did not move more than one-eighth mile from location planted (Table 8).

O, Table 7. Total tags returned, with numbers showing movement from location planted and mean days in the North Fork Payette River.

Taq Group	Date planted	Location planted	Number returned	Percent returned	Number Stating Date caught	Mean Days in river	Number stating location	Movement None	<1 mile	sl mile
K 1- 500	5/22	Dam to hatchery	74	14.8	60	43	67	44	9	14
501-1000	5/22	Sheep and Moore br.	43	8.6	31	59	35	17	7	11
1001-1400	6/11	Dam to hatchery	23	5.8	20	34	21	19	0	2
1401-1800	6/11	Sheep bridge	12	3.0	10	39	11	7	1	3
1801-2000	6/12	Subdivision	2	1.0	2	32	1	0	0	-1
2001-2200	6/12	Lakefork	2	1.0	2	40	2	0	0	2
2201-2400	6/12	Moore bridge	4	2.0	3	34	3	0	0	3
2401-2700 1/	6/30	Dam	50	18.0	42	25	42	30	12	0
2701-3000 1/	6/30	Hatchery	47	14.6	37	24	41	30	11	0
3001-3300	6/30	Sheep bridge	32	10.7	22	29	28	25	1	2
3301-3500	6/30	Subdivision	8	4.0	8	23	6	4	0	2
3501-3700	6/30	Lakefork	9	4.5	9	28	5	1	0	4
3701-3900	6/30	Moore bridge	6	3.0	6	30	5	3	1	1
3901-4300	7/16	Dam	58	14.5	40	17	35	27	8	0
4301-4600	7/16	Hatchery	26	8.7	22	23	22	14	7	1
4601-4900	7/16	Sheep bridge	47	15.7	30	25	38	28	6	4
4901-5300	7/29	Dam	37	9.3	29	16	31	27	4	0
5301-5600	7/29	Hatchery	21	7.0	27	12	19	14	5	0
5601-6000	7/29	Sheep bridge	63	15.8	50	21	52	43	6	3
6001-6700	8/26	Dam	35	5.0	30	12	34	14	20	0
6701-7300	8/26	Hatchery	51	8.5	41	11	44	41	3	0
7301-8000	8/26	Sheep bridge	101	14.4	66	11	66	55	10	1
TOTALS			751	9.4	587	R = 24	608	443	111	54

1/ 23 fish tagged with 2400 series tags and planted 6/19 at hatchery. Returns from these included 2701-3000 data.

Table 9. Number and percent tags returned by planting location.

Planting location	Number planted	Number returned	Percent returned
Dam to hatchery	900	97	10.8
Sheep and Moore br.	500	43	8.6
Dam	1,777	182	10.0
Hatchery	1,523	143	9.4
Sheep bridge	2,100	255	12.1
Subdivision	400	10	2.5
Lakefork	400	11	2.8
Moore bridge	400	10	2.5
TOTALS	8,000	751	x = 9.4

Table 10. Numbers and percent of tags returned showing movement by date planted.

Date planted	Number stating location	DISTANCE MOVED none	Percent	<1 mile	Percent	≥1 mile	Percent
5/22	102	61	59.8	16	15.7	25	24.5
6/11	32	26	81.3	1	3.1	5	15.6
6/12	6	0	0.0	0	0.0	6	100.0
6/30	127	93	73.2	25	19.7	9	7.1
7/16	95	69	72.6	21	22.1	5	5.3
7/29	102	84	82.4	15	14.7	3	2.9
8/26	144	110	76.4	33	22.9	1	0.7

Tagged fish reported caught spent an average of 24 days in the river from date stocked to date caught but ranged from an average of 11 to 59 days for the different release dates and locations (Table 7).

DISCUSSION

Since this study is yet to be completed, this discussion will be incomplete and no recommendations on management options will be presented. A more detailed discussion will appear in the final report of the study.

Due to budgetary and time constraints, we determined that the only feasible method of data collection for this study was by voluntary reporting of catch by anglers. The offer to provide information on the angler's catch was made to induce greater cooperation from the public. A high degree of reporting catch information was obtained probably as a result of this as well as due to good publicity of the study.

In any study that relies on voluntary reporting with no means of confirming the supplied information, a certain amount of error and inadequate information must be expected. This study was no exception and much valuable information was unavailable or unusable due to duplicate returns and failure to list date and/or location caught. A significant number of returns consisted of jaw tags dropped in the return boxes with no information and therefore useless except for calculating number and percent return.

Anglers' reporting of location tagged fish were caught was not as detailed as we would have liked. Generally, anglers did not report distances from landmarks of under

one-eighth mile and reported long distances in terms of distance from major landmarks rather than at some particular spot in the river (i.e. "two miles below Sheep bridge" rather than "at gravel pit below Subdivision").. As a consequence, in the data, fish reported as not having moved from location planted may actually have migrated one-eighth mile or so, but for all practical purposes, this is not considered significant movement. Also, from personal contact with anglers and from analyzing some of the data, it appears that some anglers may have miscalculated, to varying degrees, distances they reported. Although these errors may not be significant, the relative accuracy of this data compared with data collected by trained personnel should be noted.

No angler counts were made during the study, however, based on observation, it appeared that angler effort was low at the start of the study and gradually increased to a peak during the July 4 holiday. Effort remained high during the summer but peaked again during the Labor Day holiday and then declined steadily. Based on the numbers of fishermen observed and on the large percentage of tagged fish reported caught, we feel fishing pressure does warrant planting at least 8,000 catchable rainbow trout in the North Fork Payette River between Cascade Reservoir and Payette Lake.

Mean number of days tagged fish spent in the river prior to being captured is somewhat misleading since this parameter is probably a function of a number of factors, including fishing pressure exerted over time and the number of days fish were available for capture. Fish planted May 22, for instance, were subjected initially to much lighter fishing pressure and were available to the fishery for a longer period of time than fish planted August 26. Consequently, the mean number of days spent in the river for the early plants is greater than for the late plants.

It is reassuring, however, that the data shows that hatchery-reared trout are capable of surviving over fairly long periods of time prior to being caught by the angler and that they do not necessarily die shortly after planting.

Movement data for the lower river is somewhat incomplete since we were forced to discontinue planting below Sheep bridge after June 30 due to high water temperatures. Angler effort was extremely low in this section and less than 40 tags were recovered from fish planted there. Consequently, the potential for fish migrating to Cascade Reservoir from the lower sections of the river is basically untested since so few fish were planted in the lower sections and the probability of catching one of so small a group in such a large body of water is very small.

It is not surprising that no tagged fish were caught in Cascade Reservoir (reports were received of several tagged fish caught in the reservoir, but we were unable to document them) since such a small group of fish was available to the fishery. Even if all the 8,000 tagged fish migrated to Cascade Reservoir and assuming a return of 1.2%, which was the percent return of one plant of marked catchable rainbow into Cascade Reservoir in 1980 (Horner and Rieman, 1981), only 97 fish would have been reported caught. Of course, much fewer than 8,000 fish potentially migrated to Cascade Reservoir, so the potential number caught is much less. The magnitude of movement (up to 21.5 miles) shown by some tag returns indicates, however, that the fish are certainly capable of migrating to the reservoir.

One factor that was not quantified that may affect migration from plant site is habitat quality. Habitat in the North Fork Payette River below Sheep bridge is of much poorer quality than above (Horner, personal communication), and fish planted in the lower river may be more likely to move away from planting location in search of better habitat. This hypothesis is supported by the fact that, of the 22 tags

returned from the June plants in the three lower locations, only eight showed no movement. Of the 14 that did show movement, all but one were caught more than one mile from location planted.

Some unmarked, catchable-sized, hatchery-reared rainbow trout were again noted during creel census on Cascade Reservoir this summer, although in fewer numbers than in 1980 (Horner, personal communication). Hatchery personnel also observed untagged, hatchery-reared catchables caught from the study section. Apparently, substantial numbers of catchables planted in Payette Lake in the spring migrate out of the lake during high water periods. We observed large numbers of these fish just upstream of the Payette Lake regulating dam at this time that presumably left the lake shortly thereafter. Some of these fish may have migrated to Cascade Reservoir.

High water conditions probably contributed to the low returns for the early June plants and to the greater number of fish showing movement greater than one miles from the early plants. These early plants occurred at periods of near peak flows (Figure 4) and a large number of these fish may have been flushed downstream. All of the fish showing movement from the May 22 plant between the dam and hatchery of over one mile moved downstream, which tends to support this conclusion.

Of the tag returns that indicated location tagged fish were caught, only 8.9% revealed movement over one mile, which may be deemed significant movement. For the purposes of this study, movement less than one mile is considered insignificant because these fish would not migrate to Cascade Reservoir and contribute to that fishery, but rather would remain in the general vicinity of the location planted and be available to the angler there.

That few fish migrated great distances from location planted, except perhaps in conditions of high flows or poor habitat, is important because it reveals the need to select planting locations carefully. Fish should be planted at locations where heavy fishing pressure is seen to assure the greatest return to the creel, or should be evenly distributed along a river similar to the North Fork Payette if pressure is evenly distributed.

The vast majority of angler effort in the study area was localized at the dam, hatchery and Sheep bridge, with very little effort expended in other locations other than a moderate amount of pressure in the one-half mile section between the dam and hatchery. Since angler effort appeared to be extremely low below Sheep bridge and habitat conditions were poor, we plan to eliminate planting in this section in the future and concentrate planting fish in the heavily used areas.

MISCELLANEOUS ACTIVITIES

McCall Hatchery personnel reared two species of fish this year that other stations have experienced difficulty with in the past: lake and brown trout. We experienced good success in rearing these fish (Table 1) utilizing vat covers and limiting the use of starter mash when starting these fish on feed.

Vat covers were used for the lake trout until we planted them in Payette Lake and were used on the brown trout for approximately two months after ponding. Vat covers were constructed of black visqueen stretched over a frame made from 1 x 4 inch lumber and suspended over the vats with 1 x 4 inch slats. Covers were arranged over the brown trout so that a strip in the center of the vats was uncovered while the

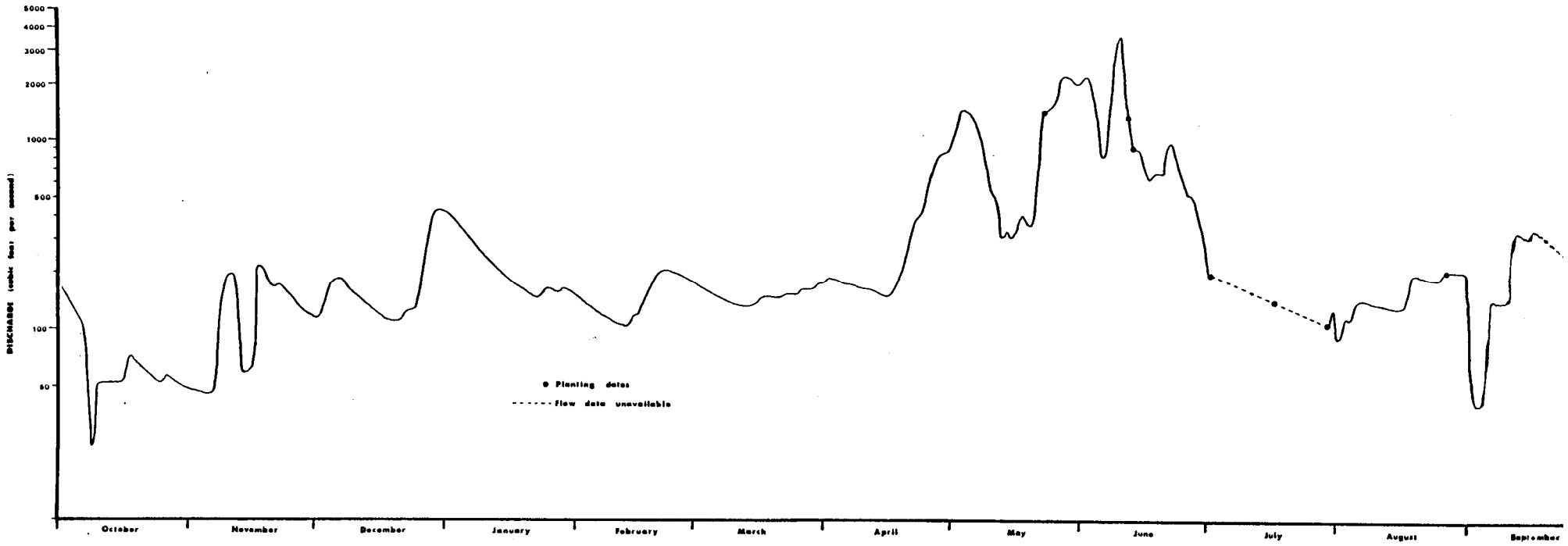

Figure 4. Discharge (cubic feet per second) of the North Fork Payette River at McCall, Idaho, October 1 1980 - September 30, 1981 (adapted from United States Geological Survey, 1981).

ACKNOWLEDGEMENTS

McCall Hatchery staff included: Larry Wimer, Fish Hatchery Superintendent II; Bill Hutchinson, Fish Hatchery Superintendent II and I; Patrick Chapman, Fish Hatchery Superintendent I and Fish Culturist; John Thorpe, Fish Culturist; Jeff Lang, Biological Aide; John Kirk, Laborer; and Thom Otto, Laborer.

Thanks are due to the following people for assistance rendered during the year: Don Anderson, Mike Dunbar and Brent Hyde for their help at Fish Lake; Ned Horner for his help at Fish Lake and with the tagging study; Mark Bivens and Bob Griswold for their assistance with the tagging study; Jim Lukens, Walt Arms and Joe Bross for their efforts at data collection for the tagging study; John Thorpe for tagging study data compilation; Fred Edwards for his assistance with fish planting; Jill Frye for her help in mountain lake planting; the many sporting goods retailers in the area that gladly received information from anglers regarding the tagging study; Scott Lemberes for supplying USFS maps for mountain lake planting; Bill Dorris and Lyn Clark for safe and enjoyably mountain lake planting; Rick Gilchrist for publicity of hatchery programs; and to Steve Roberts, Joe Lientz and Harold Ramsey for identifying fish diseases.

Special thanks are to to the many anglers who contributed information for the tagging study.

lake trout vats were completely covered. Feeding was accomplished by lifting one edge of the covers and sprinkling feed over the water. Cover panels were removed as needed for daily cleaning of vats.

Our experience with lake trout indicates they are very sensitive to light and avoid it whenever possible. Fish in vats accidentally left uncovered crowded the upper corners of the vats, apparently in an attempt to avoid light. Fish in covered vats remained much more evenly distributed throughout the vat.

Brown trout did not exhibit the light avoidance reactions, but were covered because of their reputation for being easily disturbed by activity near them. During the period directly following ponding this seemed to be the case, however, after approximately one month, the browns were not easily disturbed. When the covers were removed these fish did not show any noticeable change in behavior.

Both the lake and brown trout utilized only the bottom few inches of the vats after ponding. Feed was initially a 1:1 mixture of starter and 1/32 OMP pellets; later a 1:3 mixture and finally only 1/32 pellets. The fish consistently refused to rise to the water surface to take feed, so starter mash was eliminated from the feed after a couple of weeks. We therefore recommend starting these species on 1/32 OMP pellets or any other feed size and brand that will sink to the bottom of the vat and so be accessible to the fish.

While planting mountain lakes this year, hatchery personnel conducted mountain lake aerial surveys of those lakes planted. Special forms were filled out while flying over each lake in an attempt to compile some limited information for the Regional Fishery Biologists and Managers who determine planting schedules. With the large number of mountain lakes in each region, very little is known about each lake. These surveys will be continued in the future to supply needed information.

LITERATURE CITED

From, J. 1980. Chloramine-T for control of bacterial gill disease. Progressive Fish Culturist. 42(2): 85-86.

Gebhards, S.V. 1965. Transport of juvenile trout in sealed containers. Progressive Fish Culturist. 27(1): 31-36.

Horner, N. 1981. Personal communication. Donnelly, Idaho.

_____ and B Rieman. 1981. Cascade Reservoir fisheries investigations. Job Performance Report. 1 March 1980 to 28 February 1981. Idaho Department of Fish and Game. 85 pp.

Hutchinson, B.G. 1980. McCall Hatchery Annual Report. Idaho Department of Fish and Game. 8 pp.

Simpson, J.C. and R.L. Wallace. 1978. Fishes of Idaho. University Press of Idaho, Moscow, Idaho. 237 pp.

United States Geological Survey. 1981. United States Geological Survey primary computation of gage heights and discharge for the North Fork Payette River at McCall, Idaho. Boise, Idaho.

Warren, J.W. 1980. Diseases of hatchery fish. United States Fish and Wildlife Service, Federal Building, Ft. Snelling, Twin Cities, MN. 91 pp.

Wood, J.W. 1979. Diseases of Pacific salmon, their prevention and treatment. Hatchery Division, Department of Fisheries, State of Washington. Olympia, Washington. 82 pp.

APPENDIX

Appendix 1. Waters planted with catchable rainbow trout by McCall Hatchery.

	Water	Catalog Number
Rivers and Streams	* Bear Creek	05-14-10-0000
	Big Creek	09-14-09-0000
	Boulder Creek	07-12-10-0000
	Clear Creek	09-14-08-0000
	Crooked River	05-14-09-0000
	East Fork Lost Valley Creek	08-26-02-0003
	East Fork South Fork Salmon River	07-24-13-0000
	Gold Fork River	09-24-13-0000
	Goose Creek	07-12-13-0000
	Grouse Creek	07-24-11-0016
	Hornet Creek	08-22-00-0000
	* Indian Creek	05-12-00-0000
	Johnson Creek	07-24-13-0008
	Kennally Creek	09-14-14-0001
	Lake Creek	07-24-11-0019
	Lake Fork Creek	09-14-17-0000
	* Lick Creek	05-14-12-0000
	Little Salmon River	07-12-00-0000
	* Lost Valley Creek	08-26-02-0000
	Middle Fork Weiser River	08-19-00-0000
	Mud Creek	07-12-16-0000
	North Fork Lake Fork Creek	09-14-17-0005
	North Fork Payette River	09-14-00-0005(0006 & 0007)
	* Race Creek	07-11-00-0000
	Rapid Creek	09-14-14-0002
	* Ruby Creek	07-12-11-0018
	Skookumchuck Creek	07-08-00-0000
	Slate Creek	07-09-00-0000
	* Squaw Creek	07-12-02-0000
	Weiser River	08-00-01-0000(& -02-0000)
	West Fork Weiser River	08-26-00-0000
	Whitebird Creek	07-07-00-0000
	* Wildhorse River	05-14-00-0000
Lakes and Reservoirs	* Black Lake	07-00-00-0143
	Brundage Reservoir	07-00-00-0187
	Brown's Pond	09-00-00-0363
	Corral Creek Reservoir	09-00-00-0261
	Cruzen-Brown's Pond	09-00-00-0330
	* Cruzen- Pond	09-00-00-0314
	Elk Lake	07-00-00-0150
	Goose Lake	07-00-00-0189
	Granite Lake	09-00-00-0380
	Hazard Lake	07-00-00-0169
	* Hornet Creek Reservoir	08-00-00-0104
	Jug Reservoir	09-00-00-0317
	* Loomis Pond	09-00-00-0290
	Lower Boulder Reservoir	09-00-00-0320
	Lower California Lake	07-00-00-0249
	Milton's Pond	09-00-00-0294
	Upper Payette Lake	09-00-00-0392
	Rowland Pond	09-00-00-0328
	Seven Devils Lake	07-00-00-0249
	Warm Lake	07-00-00-0515

Appendix 2. Information card returned to anglers requesting information on tagged fish caught.

Dear _____,

You reported catching a rainbow trout on _____ with jaw tag # K_____ from the North Fork Payette River at _____ _____. This fish was planted on _____ at _____ _____. This fish: ☐ Did not move a significant distance from location planted. ☐ Moved a distance of _____ from location planted.

Thank you for your assistance in this tagging study. The information you provided will enable the Department of Fish and Game to better manage the fishery in the North Fork Payette River.

Sincerely,
Patrick F. Chapman
Fish Hatchery Supt. I

Appendix 3. Form used for aerial survey of mountain lakes.

MOUNTAIN LAKES AERIAL SURVEY FORM

Lake name_____ Catalog #_____

Date planted_____ Planted by_____

LAKE TYPE

no inlet or outlet | inlet only | outlet only | inlet and outlet

LAKE SIZE

small	medium	large

LAKE COLOR

blue	green

LAKE DEPTH

shallow	medium	deep

deep w/shallow shelf

BOTTOM TYPE

rock	mud

Vegetation present? [No] [Yes] type_____

Spawning habitat in inlet/outlet? [No] [Maybe] [Yes]

Fish rising or seen? [No] [Yes]

Comments_____

_____

Lake definitely hit	maybe missed	not hit	couldn't tell

Species planted_____ Number planted_____

Number per pound_____